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Storytelling for Systems Design: Embedding and communicating complex and intangible data through narratives

Talgorn, Elise and Hendriks, Monique

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Embedding and communicating complex and intangible data through narratives

Elise Talgorn, Monique Hendriks

Our research explores how storytelling can support complex systems thinking. In systems thinking, a major challenge is to communicate the large amount of data of complex systems and to give meaning to this data through expressing intangible aspects such as interpretation, intuition, purpose, mental bias, and uncertainty. This is key for systems thinkers to fully apprehend systems, but also for other stakeholders involved in the co-design process to easily access this complexity. There is a need for practical tools that embed in the systems design process the systems' complexity associated with relevant intangible aspects. Narratives do have the potential to gather, embed, make understandable and memorable the complex and intangible data of systems. We propose several uses of *systemic storytelling*, an approach based on building parallel story arcs constructed on and/or connected by systems' elements. Systemic storytelling combines logical analysis to an intuitive and empathetic comprehension of systems. This approach has benefits at several stages of the systems design process: to engage stakeholders and enable the sharing and capturing of their different perspectives, to effectively communicate systems insights, and to ideate on future systems. In this short paper we describe the method principles and show three preliminary application examples.

Keywords: storytelling, complexity, intangibility, perspective, communication

1 Introduction

Transforming our world positively and sustainably requires embracing the complexity of current global challenges. We need methods to approach systems from a complexity perspective, which implies studying and designing for open, unpredictable systems. This represents a major mindset shift that must be embraced not only by designers but also by other stakeholders involved in the system transformation. Furthermore, tools that are accessible and applicable in a practice context for e.g. social, organizational or innovation transformation are lacking (Hazy & Uhl-Bien, 2014; Lorino, Tricard, & Clot, 2011; Nijs, 2014).

To be successful, systems design must be a participatory process that regularly involves stakeholders in the co-design. Such co-design requires tools that support deep and holistic comprehension of systemic challenges and the ways to influence these systems. These tools must be graspable for all stakeholders with different expertise, education, and culture. Representing the complexity of the system in a way that it is communicable and understandable by all stakeholders is challenging. Visual representations of system data (called system maps, or gigamaps) are a good way to thoroughly capture system variables and connections between them but are too rich to be communicated to anyone not involved in building the map.

Another challenge is that data collection can never be complete as we deal with open systems where knowledge is heterogeneous, dispersed, incomplete, often tacit (Nijs, 2014) and "fuzzy" (Dimitrov, 2003). In selecting the data to represent the system, one cannot be exhaustive, and must rely on the insights, interpretation and intuition of the stakeholders' carrying the perspectives in the system.

With our research we want to address the need to embed in the systems design process complexity as well as intangibility, subtlety, and intuition in a way that is structural but also accessible.

2 Why stories for systems design

Understanding the complexity of a system is a matter of interpretation, and needs methods that combine a logico-scientific with an intuitive, or narrative, mode of thought (Lorino et al., 2011). The narrative mode, or other interpretive uses of language like poetic language, stimulate interpretation and communication of complexity by embedding contextuality, reflexivity, contradictions inherent to the system, purposes and motives (Stroh, 2015; Tsoukas & Hatch, 2013).

In complexity thinking the transformative outcome must be considered in terms of evolutions instead of solutions (Dimitrov, 2003). This means shifting from a linear problem/solution mindset to an evolutionary mindset (Hazy & Uhl-Bien, 2014), i.e. generating new dynamics, behaviors, ideas and processes that can evolve over time, possibly beyond the designers' control. It is difficult for people to accept the inherent unpredictability of open, non-linear systems. Storytelling has the power to unlock imagination for the storyteller and their audience and to get them out of the logical flow to spark new ideas or perspectives (Quesenbery & Brooks, 2010). Narratives can onboard stakeholders by supporting a shift from an analytical and linear mindset to an awareness of dynamic processes, relationships, unpredictability, novelty and emergence in complex systems (Tsoukas & Hatch, 2013). This allows seeing the whole system picture while relating it to its deeper structures and dynamics, which in turns may support individual awareness and willingness to act (Saltmarshe, 2018; Stroh, 2015).

Finally, storytelling transcends cultural divides of multidisciplinary teams (Gruen, Rauch, Redpath, & Ruettinger, 2002) and provides a common understanding and vocabulary (Quesenbery & Brooks, 2010). Participatory storytelling has been shown to enable inclusive and creative multi-disciplinary collaboration and the expression of different perspectives between various stakeholders that is necessary for systems co-design (Iwaniec et al., 2020; Talgorn, Hendriks, Geurts, & Bakker, 2021).

3 The systemic storytelling approach

In our research, we use *systemic stories:* parallel storylines that intersect to represent an interpretation of a system. The intersections can occur because different people interact with each other or with a same object, different events happen at the same location, a same event is perceived differently, or different people share similar behaviors, emotions, thoughts, goals or threats.

Systemic storytelling deviates from typical storytelling because:

- **Parallel stories show different perspectives.** They focus not on one but several heroes and bring a broader perspective than traditional user-centrism. Different narrative techniques and media can be used, e.g. using first- or third-person perspectives in static or interactive stories. For example the interactive storytelling experiment depicting Shakespeare's *Merchant of Venice* – notorious for offering multiple interpretations from different perspectives – creates a story world that can be explored several times (Charles, Porteous, & Cavazza, 2010).

- **Systemic stories are non-linear.** Systemic stories can be read cyclically or in parallel, without per se a beginning nor an end. For example, in the *Ghost Boat* investigation the reader navigates interwoven personal stories to find out what happened to a boat carrying 243 refugees that went missing in the Mediterranean (Reidy et al., 2015).

- **Systemic stories enable zooming in and out between different levels of comprehension.** They connect the individual experiences to the interpersonal and sociopolitical views and to the factors responsible for the problems and proposed solutions (Saltmarshe, 2018; Stroh, 2015; Winskell & Enger, 2014). They combine analytical reasoning typical in classical systems thinking with the imagination and empathy triggered by storytelling.

We foresee four uses of systemic storytelling:

1) **Engage stakeholders and show their different points of view.** Awareness of the multiple perspectives in the system is the first step to a co-design process. Storytelling of the stakeholders' experiences and opinions, for instance using auto-ethnography methods, makes them explicit and reveals tacit information important in shaping the system. In Figure 1, we show how the stakeholders narratives – visualized as story arcs (Freytag & MacEwan, 1960) – must be expressed to extract *individual variables*, i.e. data that are relative to a certain stakeholder's behavior, thought, emotion, past, environment, and how these narratives are connected by *collective variables,* i.e. shared or conflicting elements.

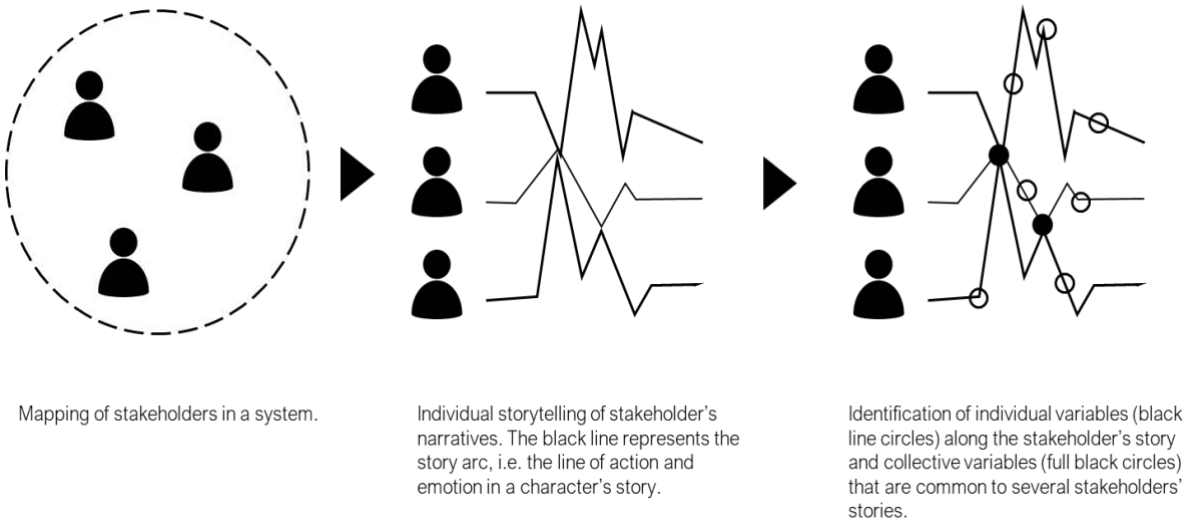

Figure 1. Storytelling to express different perspectives in a system and gather related data

2) **Comprehend and communicate system complexity and intangibility.** Complex system maps are tedious to analyze and communicate. One can use stories to facilitate details memorization (Marsh, Meade, & Roediger Iii, 2003) and to integrate subtle and intangible aspects of people's experiences such as purpose, priorities, mental bias, social interdependencies, and emotions. Stories can highlight the most relevant or critical parts of the system, reflecting the interpretation and intuition of the system analyst to create meaning as well as communicating uncertainties. Secondary data can be embedded less prevalently in the story e.g. through descriptions, anecdotes, subplots, hence staying in the background without being excluded. Figure 2 shows how a system map can be simplified using narratives.

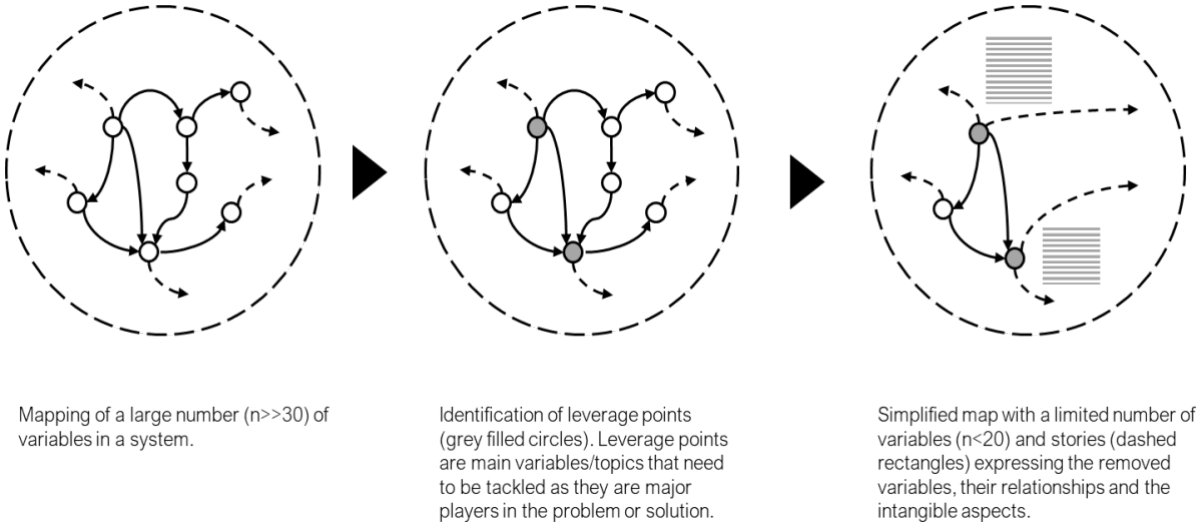

Figure 2. Storytelling combined with system mapping to communicate complex and intangible systems insights

3) **Ideate on future systems.** Systems transformation is generally a stepwise process, where solution ideation is often approached from an incremental perspective. Disruptive transformation can also be achieved by imagining radically new systems and back casting realistic transformation steps. However, it is very difficult to envision radically transformed systems because it implies a major change and reshuffle of the system elements, hence assimilating large data sets and new mental models. Storytelling supports apprehending a large amount of details as explained above and story or scenario building is a known design tool for creative future ideation (Bourgeois-Bougrine, Latorre, & Mourey, 2018; Lichaw, 2016; Parrish, 2014). Future story creation based on current systems data can be used for disruptive system ideation (Iwaniec et al., 2020). In Figure 3 we propose such an ideation process that uses envisioning of parallel future stakeholders' narratives from which future systems data, as well as unthought-of connections that are seeds for new solutions, are extracted.

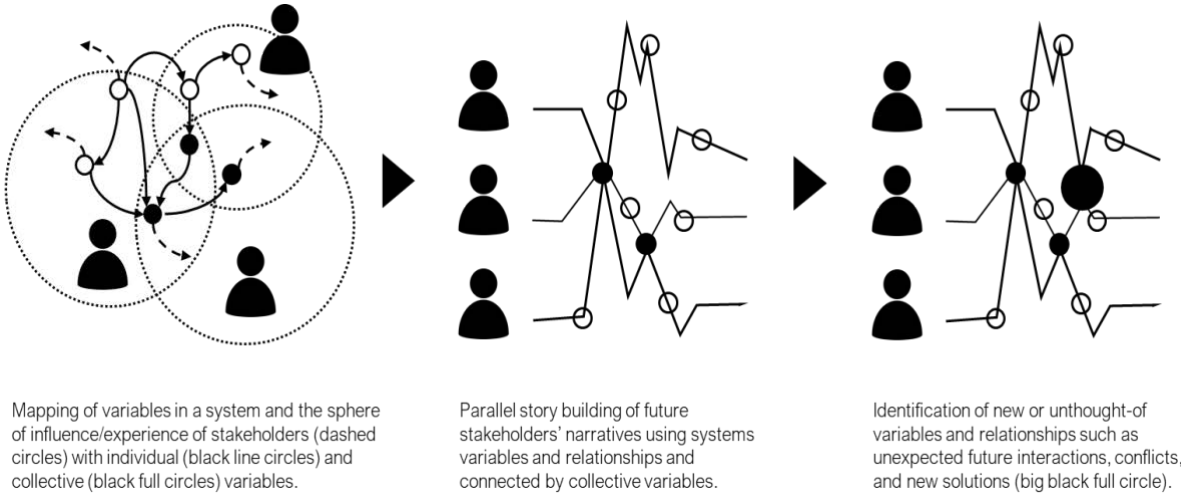

Figure 3. Parallel story building to ideate on future systems

4) **Change behaviors to transform systems.** Storytelling has the power to change bias and trigger action through awareness creation and narrative transportation. This can be used for behavior and cultural change of users and consumers in the solution implementation phase (Chamberlin & Boks, 2018; Daae, Chamberlin, & Boks, 2018; Gebbers, De Wit, & Appel, 2017; Van den Hende, 2010; Winskell & Enger, 2014) to enable system transformation. It can also be used to engage critical stakeholders during the system co-design, by changing bias or creating a sense of community around a narrative or vision (Sergeeva & Trifilova, 2018; Winskell & Enger, 2014).

4 Exploratory systemic storytelling experiments

In this section, we share examples of the first three uses of storytelling in systems design, executed at a large company as part of the innovation process. The systems design process that we typically follow is represented in Figure 4. It is inspired by the Systemic Design Toolkit from the design agency Namahn (Namahn). In the first phase of exploring which data to include in the system study, we use storytelling to engage stakeholders in sharing their perspective (*Example 1*). After building the system map, storytelling is used to communicate the system's complex insights and the interpretation of the systems analyst to stakeholders (*Example 2*). The system map is then used to identify leverage points and opportunities for ideation. The ideation for intervention points and future systems is supported by the creation of parallel and intersecting storylines (*Example 3*). Finally, when implementing solutions, storytelling can again be used for stakeholder engagement and user/consumer behavior change.

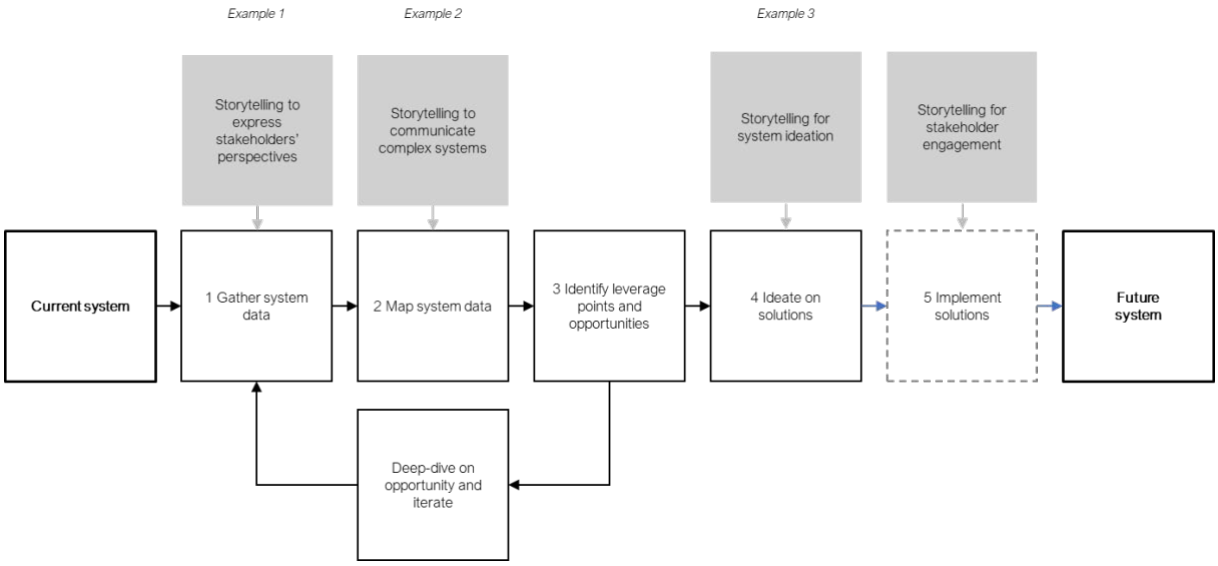

Figure 4. Simplified representation of our systems design process with storytelling intervention points

Example 1 | Individual perspective writing to express the dynamics of collaboration in a multidisciplinary group.

For a systemic study aimed at understanding and improving the dynamics of internal collaboration in an organization, we gathered people's perspectives within small multidisciplinary teams representative of the bigger group. We organized a role play, putting the participants in a fictional situation, which was the kick-start of a multidisciplinary project. We asked them to align on the project's main deliverable and define roles. Afterwards, each participant wrote about their individual experience of the collaboration and the perception of their role by others. In a third step, the participants read their personal stories to each other and discussed the differences and commonalities. They listed the barriers and enablers for collaboration, as well as the emerging mental models for each role.

This exercise resulted in preliminary identification of critical attention points and opportunity areas. The participants felt the exercise generated insights into the collaboration dynamics at a deep level (bringing up topics such as trust and fear of conflict). As a secondary benefit, the expression of individual emotions and perceptions contributed to team building and a better understanding of the roles and responsibilities.

Example 2 | A system representation combining mapping and stories to effectively communicate to decision makers.

To identify enablers for an organizational transformation towards a defined strategic target, we analyzed systemically the organization structure and dynamics resulting in an extensive system map with n>200 variables. Alignment with key stakeholders and decision makers required effectively sharing the insights of the map with them.

Verbally explaining the variables, their connections, the identified gaps and opportunities while navigating the map visually took 45 minutes. While the stakeholders praised the methodology for the insights it uncovered, the general feedback was that it was "a lot of information to consume all at once" and that "the output is complicated and difficult to understand".

We simplified the map following the process shown in Figure 3, creating story blocks that expressed the deleted variables, connections, gaps, opportunities and intangible aspects such as stakeholders' biases, struggles and sense of urgency. Graphical elements were used to visually guide the reading, such as circularly arranging the story blocks and associating them with the respective parts of the simplified map using color coding. The systemic story map could be shared in 30 minutes. The stakeholders underscored that the map was "an awesome communication piece" and appreciated the tangibility of non-obvious connections and wide-ranging perspectives.

Creation of the complete, granular system map was necessary in the analysis phase to organize the collected data and to obtain the profound understanding of the system mechanics needed to identify hidden gaps and opportunities, but it was impossible to communicate the map full complexity to stakeholders and trying to do so can even damage their engagement. The simplified map using stories, with an important role of visual storytelling, did enable to successfully share the complex insights.

Example 3 | Parallel story building to ideate on new solutions to a systemic problem.

In this project the goal was to find new solutions to improve awareness for a health problem with lifestyle causes and consequences, associated with multiple co-morbidities. We approached the issue holistically, using system mapping to form a model of the interactions leading to and resulting from this condition, including clinical, experiential, social, emotional aspects and the set up and perception of the health care system.

In an ideation workshop, a team of designers and scientists created sets of parallel future storylines based on the system map of the current situation. We used exercises to guide exploration of the system map and to coach on creative story writing. Each participant built a fictional character experiencing tensions and problems found in the map. The participants shared their characters in groups of four and brainstormed on a plotline where the individual storylines intersected, i.e. where their characters interacted with each other, experienced the same events, and/or interacted with the same object. The participants individually wrote stories from their character's perspective but involving all four characters. After the workshop, the stories were analyzed to filter out new ideas or unexpected conflicts.

The process resulted in identification of 8 interesting new opportunities to explore of which 4 were systemic in nature, meaning that they crossed the borders of a purely technical intervention or point solution: they solved problems related to many users with conflicting needs or to large heterogeneous data ecosystems.

5 Future research and outlook

The three experiments described here show promising results for the use of storytelling at different stages of the systems design process, ranging from the gathering of insights to construct the map to communicating the complexity of the constructed map and ideating on future states of the system. Through engaging logic reasoning as well as narrative thought, systemic storytelling allows for thorough understanding of complex systems with limited time investment and without requiring expertise on systems design. It enables expression and

involvement of different perspectives, which is crucial to reveal hidden systems mechanics and new opportunities, as well as engaging a diverse set of stakeholders in the envisioned systemic change.

Future experiments should empirically investigate these effects, as well as the influence of different narrative techniques, genres and media, to conclude on the impact of systemic storytelling on the systems design process and outcome. Also, the application of the approach in different contexts and at different scales should be categorized and linked to the existing literature in transformative and complexity practices.

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